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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,670	06/18/2001	Ryuichi Matsuda	209667US-2	7193

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EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 02/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/881,670

Applicant(s)

MATSUDA ET AL.

Examiner

Luz L. Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 5-10 and 12-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 June 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election of group I in Paper No. 10 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Drawings

Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 2-lines 10 and 13, the use of the phrase "adjusted to vary" and the word "adjusted", respectively, are not understood since it is unclear how the respective coils or the distribution of energy absorbed to a plasma can be adjusted. For example, once

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the coil length has been determined and the coil has been cut, it is not clear as to how the dimensions of the coil can be subsequently altered. Clarification is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishii et al., U.S. Patent 5,571,366.

Ishii et al. shows the invention as claimed including a semiconductor manufacturing apparatus comprising: a vessel 110 having an electromagnetic wave transparent window 111; a power supply antenna 116,117 provided outside the vessel and opposed to the electromagnetic wave transparent window 111; and a power source for applying a high frequency voltage to the power supply antenna 116,117; and being adapted to apply the high frequency voltage from the power source to the power supply antenna to generate an electromagnetic wave, and pass the electromagnetic wave through the electromagnetic wave transparent window into the vessel to generate a

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plasma, thereby treating a surface of a substrate W in the vessel 110, wherein the power supply antenna 116,117 comprises a plurality of coils disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into the form of an arc, and is configured such that power supply portions formed at opposite ends of the respective coils so as to be connected to the power source are located in different phases on a same plane (see figs. 23-25 and col. 15-line 64 to col. 18-line 7).

Claims 1 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al., U.S. Patent 6,288,493.

Lee et al. shows the invention as claimed including a semiconductor manufacturing apparatus 10 comprising: a vessel 104 having an electromagnetic wave transparent window; a power supply antenna 100/100' provided outside the vessel and opposed to the electromagnetic wave transparent window; and a power source 102/102' for applying a high frequency voltage to the power supply antenna; and being adapted to apply the high frequency voltage from the power source to the power supply antenna to generate an electromagnetic wave, and pass the electromagnetic wave through the electromagnetic wave transparent window into the vessel to generate a plasma, thereby treating a surface of a substrate 106 in the vessel 104, wherein the power supply antenna comprises a plurality of coils 300a, 300b / 310a, 310b, 310c disposed concentrically, the plurality of coils being prepared by bending a plurality of conductors each into the form of an arc, and is configured such that power supply portions formed at opposite ends of the respective coils so as to be connected to the power source are

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located in different phases on a same plane (see figs. 1, 3A-3B, col. 1-line 43 to col. 2-line 2 and col. 3-line 34 to col. 4-line 67).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., U.S. Patent 6,288,493.

Lee et al. is applied as above but fails to expressly disclose where spacing between the adjacent power supply portions in the respective coils is equal. However, it would have been obvious to one of ordinary skill in the art at the time the invention was

made to determine through routine experimentation the optimum spacing between the power supply portions in adjacent coils based upon a variety of factors including reducing potential problems such as cross over of wires connecting different coils to the power supply that can lead to shorting, thereby improving the efficiency and effectiveness of the apparatus.

Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., U.S. Patent 6,288,493 in view of Holland et al., U.S. Patent 5,800,619.

Lee et al. is applied as above but fails to expressly disclose where radii or thicknesses of the respective coils are varied causing varying self inductances and mutual inductances, which also creates varying currents flowing through the respective coils so that a distribution of energy absorbed to a plasma is adjusted, and at least one of the coils is disposed on a plane other than the same plane to vary mutual inductances so that a distribution of energy absorbed to a plasma is adjusted. Holland et al. suggests positioning coils in many different planes above a dielectric window (see col. 14-lines 10-23) and varying the thicknesses of respective coils so as to vary mutual and self inductances (see col. 13-line 46 to col. 14-line 9). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Lee et al. so as to produce a coil structure as suggested by Holland et al. because this produces an apparatus with a plasma having a relatively uniform density (see col. 13-lines 46-51).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al., U.S. Patent 5,571,366.

Ishii et al. is applied as above but fails to expressly disclose where spacing between the adjacent power supply portions in the respective coils is equal. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine through routine experimentation the optimum spacing between the power supply portions in adjacent coils based upon a variety of factors including reducing potential problems such as cross over of wires connecting different coils to the power supply that can lead to shorting, thereby improving the efficiency and effectiveness of the apparatus.

Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al., U.S. Patent 5,571,366 in view of Holland et al., U.S. Patent 5,800,619.

Ishii et al. is applied as above but fails to expressly disclose where radii or thicknesses of the respective coils are varied causing varying self inductances and mutual inductances, which also creates varying currents flowing through the respective coils so that a distribution of energy absorbed to a plasma is adjusted, and at least one of the coils is disposed on a plane other than the same plane to vary mutual inductances so that a distribution of energy absorbed to a plasma is adjusted. Holland et al. suggests positioning coils in many different planes above a dielectric window (see col. 14-lines 10-23) and varying the thicknesses of respective coils so as to vary mutual and self inductances (see col. 13-line 46 to col. 14-line 9). In view of this disclosure, it


would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Ishii et al. so as to produce a coil structure as suggested by Holland et al. because this produces an apparatus with a plasma having a relatively uniform density (see col. 13-lines 46-51).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 703-305-4545. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


Luz L. Alejandro
Patent Examiner
Art Unit 1763

February 15, 2003